

DAFTAR PUSTAKA

- Abbas, H.H., Authman, M.M., Zaki, M.S. & Mohamed, G.F. 2012. Effect of seasonal temperature changes on thyroid structure and hormones secretion of white grouper (*Epinephelus Aeneus*) in Suez Gulf, Egypt. *Life Science J.* 9(2): 700-705.
- Abol-Munafi, A.B., Asmanelli, Effendy, A.M.W. & Soh, M.A. 2005. Effect of exogenous thyroxine on morphology and development of thyroid gland in Marble Goby *Oxyeleotris marmoratus* Bleeker larvae. *J. Animal Vet. Adv.* 4(7): 630-636.
- Affandi, R., Sjafei, D.S., Rahardjo, M.F. & Sulistiono. 2009. Fisiologi ikan, pencernaan dan penyerapan makanan. IPB Press 240 p.
- Ahmad, T. 1998. Status of research on grouper in Indonesia. pp. 42-49. In Rimmer (Ed). Proceedings Grouper Aquaculture Research Workshop. ACIAR.
- Alit, A.A. 2007. Aplikasi teknologi budidaya pembenihan kerapu sunu (*Plectropomus leopardus*) pada hatchery skala rumah tangga di pesisir pantai kec. Gerokgak kab. Buleleng Bali. pp. 132-138. Prosiding Seminar Nasional Kelautan III. Universitas Hang Tuah, Surabaya.
- Allen, R.D. 1995. Biochemical pathways and enzymes. pp. 38-48. In Biology, a critical thinking approach. Wm.C.Brown Publishers. USA.
- Alt, B., Reibe, S., Feitosa, N.M., Elsalini, O.A., Wendl, T. & Rohr, K.B. 2006. Analysis of origin and growth of the thyroid gland in zebrafish. *Developmental Dynamics* 235: 1872-1883.
- Amble, J.W., Ferrari, F.D. & Fornshell, J.A. 1991. Population structure and swarm formation of the cyclopoid copepod *Dioithona oculata* near mangrove cays. *J. of Plankton Research* 13(6): 1257-1272.
- Andamari, R., Teguh, B. & Mujimin. 2005. Kajian ekspor kerapu dari propinsi Bali. pp. 259-268. Dalam Sudrajat *et al.* (Ed). Buku Perikanan Budidaya Berkelanjutan.
- _____. 2008. Peran lama pencahayaan dalam pemeliharaan larva ikan kerapu sunu (*Plectropomus leopardus*). pp. 1-5. BP12. Dalam Djumanto *et al.* (Ed). Seminar Nasional Tahunan V Hasil Penelitian Perikanan dan Kelautan. Universitas Gadjah Mada. Yogyakarta.
- _____ & Melianawati, R. 2008. Perkembangan morfologi larva kerapu sunu (*Plectropomus leopardus*) stadia awal. pp. 147-149. Dalam Prosiding Seminar Nasional Biodiversitas II. Departemen Biologi Universitas Airlangga. Surabaya.
- _____. 2009. Perbaikan pemeliharaan larva kerapu sunu (*Plectropomus leopardus*). pp. 13-17. Dalam Prosiding Forum Inovasi Teknologi Akuakultur Buku 1. Pusat Riset Perikanan Budidaya. Jakarta.
- Anitha, P.S. & George, R.M. 2006. The taxonomy of *Brachionus plicatilis* species complex (Rotifera: Monogononta) from the Southern Kerala (India) with a note on their reproductive preferences. *J. Mar. Biol. Ass. India* 48(I): 6-13.

- Anonymous. 2004. Keputusan Menteri Lingkungan Hidup No. 51 tahun 2004. Tentang Baku Mutu Air Laut. Kantor Menteri Negara Lingkungan Hidup. Jakarta. 32 p.
- _____. 2012. Thyroid hormones <http://www.biocyclopedia.com>. Diakses 07-06-2013.
- _____. 2015. The study of copepod nauplius, a baby copepod. Laboratory of Restoration Ecology, Toda Lab, Soka University. <http://www.t.soka.ac.jp>. Diakses 10-10-2015.
- Aristabazal, E.O. 2005. Morphological development of the mouth and improvement in feeding ability in the early larval stages of red porgy *Pagrus pagrus* (L.). *Rev. Invest. Dessar. Pesq.* 17: 43-53.
- Aslianti, T., Suwirya, K. & Asmanik. 2008. Teknologi pemeliharaan larva kerapu sunu (*Plectropomus leopardus*) secara massal. *J. Riset Akuakultur* 3(1): 1-11.
- Astuti, N.W.W., Melianawati, R., Andamari, R. 2011. Pengamatan oksigen terlarut pada media pemeliharaan larva kerapu sunu *Plectropomus leopardus*. pp. 345-349. *Dalam* Prosiding Forum Inovasi Teknologi Akuakultur Jilid 1. Pusat Riset Perikanan Budidaya. Jakarta.
- Audesirk, T. & Audesirk, G. 1999. Nutrition and digestion. pp. 570-59. *In* Biology, life on earth. 5th ed. International edition. Prentice-Hall. USA.
- Ayson, F.G. & Lam, T.J. 1993. Thyroxine injection of female rabbitfish (*Siganus guttatus*) broodstock: changes in thyroid hormone levels in plasma, eggs, and yolk-sac larvae, and its effect on larval growth and survival. *Aquaculture* 109: 83-93.
- Babaei, S.S., Kenari, A.A., Nazari, R. & Gisbert, E. 2011. Developmental changes of digestive enzymes in Persian sturgeon (*Acipenser persicus*) during larval ontogeny. *Aquaculture* 318: 138-144.
- Badawi, G.M. 2011. Effect of thyroid stimulating hormone on the ultrastructure of the thyroid gland in the Mexican axolotl during metamorphic climax. *J. Applied Pharmaceutical Science* 1(4): 60-66.
- Baker, S. 2013. Export doubts for coral trout. <http://www.abc.net.au>. Diakses 12-06-2013.
- Balon, E.K. 1984. Reflection on some decisive events in the early life of fishes. *Trans. Am. Fish. Soc.* 113: 178-185.
- Båmstedt, U. 1988. Interspecific, seasonal and diel variations in zooplankton trypsin and amylase activities in Kosterfjorden, western Sweden. *Mar. Ecol. Prog. Ser.* 44: 15-24.
- Baragi, V. & Lovell, R.T. 1986. Digestive enzyme activities in striped bass from first feeding through larva development. *Trans. Am. Fish. Soc.* 115: 478-484.
- Barkley, R.A. & Thompson, T.G. 1953. The total Iodine and Iodate-iodine content of sea-water. *Deep Sea Research* 7(1): 24-34.
- Barroso, M.V., de Carvalho, C.V.A., Antoniassi, R. & Cerqueira, V.R. 2013. Use of the copepod *Acartia tonsa* as the first live food for larvae of the fat snook *Centropomus parallelus*. *Aquaculture* 388-391: 153-158.

- Beck, J.L. & Turingan, R.G. 2007. The effects of zooplankton swimming behavior on prey-capture kinematics of red drum larvae, *Sciaenops ocellatus*. *Mar. Biol.* 151: 1463-1470.
- Bell, J.G., McEvoy, A.A., Estevez, A., Shields, R.J. & Sargent, J.R. 2003. Optimising lipid nutrition in first-feeding flatfish larvae. *Aquaculture* 22: 211-220.
- Bergmeyer, H.U., Grossl, M. & Walter H.E. 1983. Reagents for enzymatic analysis. pp. 274-275. In Bergmeyer, H.U. (Ed.) *Methods in enzymatic analysis* 2. 3rd ed. Weinheim.
- Bernfield, P. 1955. Amylase A and B. pp. 149-157. In P. Colowick & N.O. Kaplan (Eds.) *Methods in enzymology* 1. Academic Press. New York.
- Bischoff, K.M., Shi, L. & Kennelly, P.J. 1998. The detection of enzyme activity following sodium dodecyl sulfate-polyacrylamide gel electrophoresis. *Anal. Biochem.* 260: 1-17.
- Blaxter, J.H.S. 1969. Development: Eggs and larvae. pp. 178-252. In *Fish physiology* 3. Academic Press New York and London.
- Bluhm, K., Croot, P., Wuttig, K. & Lochte, K. 2010. Transformation of iodate to iodide in marine phytoplankton driven by cell senescence. *Aquat. Biol.* 11: 1-15.
- Bolasina, Pe´rez, S.A. & Yamashita, Y. 2006. Digestive enzymes activity during ontogenetic development and effect of starvation in Japanese flounder, *Paralichthys olivaceus*. *Aquaculture* 252: 503-515.
- Bone, Q. & Moore, R.H. 2008. Endocrine system. pp. 255-288. In *Biology of Fishes* 3rd ed. Taylor & Francis Group.
- Borlongan, I.G. 1990. Studies on the digestive lipases of milkfish, *Chanos chanos*. *Aquaculture* 89: 315-325.
- Boyd, C.E. 1990. Water quality in ponds for aquaculture. Department of Fisheries and Applied Aquacultures. Auburn University, Alabama. 482 p.
- Buddington, R.K. & Diamond, J.M. 1989. Ontogenic development of intestinal nutrients transporters. *Annu. Rev. Physiol.* 51: 601-619.
- Buentello, A.J., Pohlenz, C., Margulies, D., Scholey, V.P., Wexler, J.B., Tovar-Ramírez, D., Neill, W.H., Hinojosa-Baltazar, P. & Gatlin, D.M. 2011. A preliminary study of digestive enzyme activities and amino acid composition of early juvenile yellowfin tuna (*Thunnus albacares*). *Aquaculture* 312: 205-211.
- Cahu, C. & Infante, J.Z. 1995. Maturation of the pancreatic and intestinal digestive functions in sea bass (*Dicentrarchus labrax*): effect of weaning with different protein sources. *Fish Phys. Biochem.* 14(6): 431-437.
- Camargo, J.A. & Alonso, A. 2006. Ecological and toxicological effects of inorganic nitrogen pollution in aquatic ecosystems: A global assessment. *Environment International* 32: 831-849.
- Campbell, N.A., Reece, J.B., Taylor, M.R., Simon, E.J. & Dickey, J.L. 2009. Hormones and the endocrine system. pp. 516-531. In *Biology concept and connections* 6th ed. Pearson Education Inc. USA.

- Cara, J.B., Moyano, F.J., Cardenas, S., Fernández-Díaz, C. & Yufera, M. 2003. Assessment of digestive enzyme activities during larval development of white bream. *J. Fish Biol.* 63: 48-58.
- Carić, M., Sanko-Njire, J. & Skaramuca, B. 1993. Dietary effects of different feeds on the biochemical composition of the rotifer (*Brachionus plicatilis* Miiller). *Aquaculture* 110: 141-150.
- Chin, B-S., Nakagawa, M., Tagawa, M., Masuda, R. & Yamashita, Y. 2010. Ontogenetic changes of habitat selection and thyroid hormone levels in black rockfish (*Sebastes schlegelii*) reared in captivity. *Ichthyol Res.* 57: 278-285.
- Cho, N., Trinh, T.H. & Lam, N. 2012. Species diversity of zooplankton in coastal waters of Vietnam - family Acartidae (Copepoda). *Tap Chi Sinh Hoc, North America.* 34(3).
- Colin, P.L. & Koenig, C.C. 1994. Spines in larval red grouper, *Epinephelus morio*: Development and function. pp. 31-38. Proceedings of the 44th Gulf and Caribbean Fisheries Institute.
- Comabella, Y., Mendoza, R., Aguilera, C., Carrillo, O., Hurtado, A. & Garcia-Galano, T. 2006. Digestive enzyme activity during early larval development of the Cuban gar *Atractosteus tristoechus*. *Fish Physiol. Biochem.* 32: 147-157.
- Conceição, L.E.C., Aragão, C. & Rønnestad, I. 2010. Protein metabolism and amino acid requirements in fish larvae. pp. 250-263. In: Cruz-Suarez *et al.* (Eds), *Avances en Nutrición Acuicola X - Memorias del Décimo Simposio Internacional de Nutrición Acuicola, México.*
- Conway, D.V.P., Tranter, P.R.G. & Coombs, S.H. 1993. Digestion of natural food by larval and post-larval turbot *Scophthalmus maximus*. *Mar. Ecol. Prog. Ser.* 100: 221-231.
- Crompton, T.R. 2006. Determination of anions. pp. 39-97. In *Analysis of seawater. A Guide for the analytical and environmental chemist.* Springer Berlin Heidelberg.
- Cuvier-Péres, A. & Kestemont, P. 2002. Development of some digestive enzymes in Eurasian perch larvae *Perca fluviatilis*. *Fish Physiol. and Biochem.* 24: 279-285.
- Davies, C., Adams, S., Murchie, C., Mapstone, B., Samoilys, M., Pears, R. & Russ, G. 2013. Coral trout. <http://www.reef.crc.org.au>. Diakses 31-05-2013.
- Dabrowski, K. & Glogowski, J. 1977. Studies on the role of exogenous proteolytic enzymes in digestion processes in fish. *Hydrobiologia* 54(2): 129-134.
- _____. 1979. The feeding of fish larvae: present (state of the art) and perspective. *Repro. Nutri. Develop.* 24(6): 807-833.
- Dhert, P., Rombaut, G., Suantika, G. & Sorgeloos, P. 2001. Advancement of rotifer culture and manipulation techniques in Europe. *Aquaculture* 200: 129-146.
- Deguara, S., Jauncey, K. & Agius, K. 2003. Enzyme activities and pH variations in the digestive tract of gilthead sea bream. *J. Fish. Biol.* 62: 1033-1043.

- de Jesus, E.G., Hirano, T. & Inui, Y. 1991. Changes in cortisol and thyroid hormone concentrations during early development and metamorphosis in Japanese Flounder *Paralichthys olivaceus*. *Gen. Comp. Endocrinol.* 82: 369-376.
- _____, Toledo, J.D. & Simpas, M.S.. 1998. Thyroid hormones promote early metamorphosis in grouper (*Epinephelus coioides*) larvae. *Gen. Comp. Endocrinol.* 112: 10-16.
- de Lima, L.C.M. & L.P. Souza-Santos. 2007. The ingestion rate of *Litopenaeus vannamei* larvae as a function of *Tisbe biminiensis* copepod concentration. *Aquaculture* 271: 411-419.
- Delgado, J.B.O., Ruane, N.M., Pousão-Ferreira, P., Dinis, M.T. & Sarasquete, C. 2006. Thyroid gland development in Senegalese sole (*Solea senegalensis* Kaup 1858) during early life stages: A histochemical and immunohistochemical approach. *Aquaculture* 260: 346-356.
- Denstadli, V., Skred, A., Krogdahl, A., Sahlstrøm, S. & Storebakken, T. 2006. Feed intake, growth, feed conversion, digestibility, enzyme activities and intestinal structure in Atlantic salmon (*Salmo salar* L.) fed graded levels of phytic acid. *Aquaculture* 256: 365-376.
- Diani, S., Slamet, B., Ismail, A. & Imanto, P.T. 1991. Studi pendahuluan pemijahan alami dan perkembangan awal larva kerapu sunu. *J. Penelitian Budidaya Pantai* 7: 10-19.
- Díaz-López, M., Moyano-López, F.J., Alarcón-López, F.J., García-Carreño, F.L. & Navarrete del Toro, M.A. 1998. Characterization of fish acid proteases by substrate-gel electrophoresis. *Comp. Biochem. Physiol. B* 121: 369-377.
- Disbrey, B.D. & Rack, J.H. 1970. Histological laboratory methods. E. & S. Livingstone, Edinburgh and London. 414 p.
- Doi, M., Ohno, A., Taki, Y., Singhagraiwan, T. & Kohno, H. 1997a. Nauplii of the calanoid copepod, *Acartia sinjiensis*, as an initial food organism for larval red snapper, *Lutjanus argentimaculatus*. *Suisanzoshoku* 45(1): 31-40.
- _____, Toledo, J.D., Golez, M.S.N., de los Santos, M. & Ohno, A. 1997b. Preliminary investigation of feeding performance of larvae of early red-spotted grouper, *Epinephelus coioides*, reared with mixed zooplankton. *Hydrobiologia* 358: 259-263.
- Drossou, A., Ueberschär, B., Rosenthal, H. & Herzig, K. 2006. Ontogenetic development of the proteolytic digestion activities in larvae of *Oreochromis niloticus* fed with different diets. *Aquaculture* 256: 479-488.
- Dumont, J., Opitz, R., Christophe, D., Vassart, G., Roger, P.P. & Maenhaut, C. 2011. Ontogeny, anatomy, metabolism and physiology of the thyroid. www.thyroidmanager.org. Diakses 07-06-2013.
- Edeline, E., Bardonnet, A., Bolliet, V., Dufour, S. & Elie, P. 2005. Endocrine control of *Anguilla anguilla* glass eel dispersal: Effect of thyroid hormones on locomotor activity and rheotactic behavior. *Hormones and Behavior* 48: 53-63.
- Effendie, M.I. 2002. Biologi perikanan. Yayasan Pustaka Nusantara. 163 p.

- Einarsdóttir, I.E., Silva, N., Power, D.M., Smáradóttir, H. & Björnsson, B.T. 2006. Thyroid and pituitary gland development from hatching through metamorphosis of a teleost flatfish, the Atlantic halibut. *Anat. Embryol.* 211: 47-60.
- Elsalini, O.A., von Gartzen, J., Cramer, M. & Rohr, K.B. 2003. Zebrafish *hhx*, *nk2.1a*, and *pax2.1* regulate thyroid growth and differentiation downstream of Nodal-dependent transcription factors. *Developmental Biology* 263: 67-80.
- Enger, E.D. & Ross, F.C. 2000. Enzymes. pp. 80-89. *In* Concept in Biology 9th ed. McGraw-Hill Companies.
- Evjemo, J.O., Reitan, K.I. & Olsen, Y. 2003. Copepods as live food organisms in the larval rearing of halibut larvae (*Hippoglossus hippoglossus* L.) with special emphasis on the nutritional value. *Aquaculture* 227: 191-210.
- Febiyanti, F. & Syahailatua, A. 2008. Kebiasaan makan ikan terbang, *Hirundicthys oxycephalus* dan *Cheilopogon cyanopterus*, di perairan Selat Makassar *J. Lit. Perikan. Ind.* 14(1): 115-122.
- Fernandez, I. & Gisbert, E. 2010. Senegalese sole bone tissue originated from chondral ossification is more sensitive than dermal bone to high vitamin A content in enriched Artemia. *J. Appl. Ichthyol.* 26: 344-349.
- Ferraris, R.P., Tan, J.D. & de La Cruz, M.C. 1987. Development of the digestive tract of milkfish, *Chanos chanos* (Forsskal): Histology and histochemistry. *Aquaculture* 61: 241-257.
- Fortier, L., Ponton, D. & Gilbert, M. 1995. The match/mismatch hypothesis and the feeding success of fish larvae in ice-covered southeastern Hudson Bay. *Mar. Ecol. Prog. Ser.* 120: 11-27.
- Frisch, A. & Anderson, T. 2005. Physiological stress responses of two species of coral trout (*Plectropomus leopardus* and *Plectropomus maculatus*). *Comp. Biochem. Physiol. A* 140: 317-327.
- Fuiman, L.A. 1983. Growth gradients in fish larvae. *J. Fish Biol.* 23: 117-123.
- Fujii, A., Kurokawa, Y., Kawai, S., Yoseda, K., Dan, S., Kai, A. & Tanaka, M. 2007. Diurnal variation of tryptic activity in larval stage and development of proteolytic enzyme activities of malabar grouper (*Epinephelus malabaricus*) after hatching. *Aquaculture* 270: 68-76.
- Fukuhara, O. & Fushimi, T. 1988. Fin differentiation and squamation of artificial reared grouper *Epinephelus akaara*. *Aquaculture* 69: 379-386.
- Galaviz, M.A., García-Gasca, A., Drawbridge, M., Álvarez-González, C.A. & López, L.M. 2011. Ontogeny of the digestive tract and enzymatic activity in white seabass, *Atractoscion nobilis*, larvae. *Aquaculture* 318: 162-168.
- Gall, E. A., Küpper, F.C. & Kloareg, B. 2005. A survey of iodine content in *Laminaria digitata*. *Botanica Marina* 47(1): 30-37.
- Gamboa-Delgado, J., Le Vay, L., Fernandez-Diaz, C., Cañavate, P., Ponce, M., Zerolo, R. & Manchado, M. 2011. Effect of larval feeding regime on trypsinogen gene expression, proteolytic enzyme activity and dietary carbon and nitrogen assimilation in Senegalese sole (*Solea senegalensis*) larvae. *Comp. Biochem. Physiol. B* 158: 251-258.

- Garcia, A., Cortes, D., Ramirez, T., Giraldez, A. & Carpena, A. 2003. Contribution of larval growth rate variability to the recruitment of the Bay of Málaga anchovy (SW Mediterranean) during the 2000-2001 spawning seasons. *Sci. Mar.* 67(4): 477-490.
- García-Gasca, A., Galaviz, M.A., Gutiérrez, J.N. & García-Ortega, A. 2006. Development of the digestive tract, trypsin activity and gene expression in eggs and larvae of the bullseye puffer fish *Sphoeroides annulatus*. *Aquaculture* 251: 366-376.
- Garcia-Ortega, A.G., Verreth, J. & Segner, H. 2000. Post-prandial protease activity in digestive tract of African catfish *Clarias gariepinus* fed decapsulated cysts of Artemia. *Fish Physiol. and Biochem.* 22 (3): 237-244.
- Gavaia, P.J., Dinis, M.T. & Cancela, M.L. 2002. Osteological development and abnormalities of the vertebral column and caudal skeleton in larval and juvenile stages of hatchery-reared Senegal sole (*Solea senegalensis*). *Aquaculture* 211: 305-323.
- Gavlik, S., Albino, M. & Specker, J.L. 2002. Metamorphosis in summer flounder: manipulation of thyroid status to synchronize settling behavior, growth, and development. *Aquaculture* 203: 359-373.
- Gawlicka, Parent, A.B., Horn, M.H., Ross, N., Opstad, I. & Torrissen, O.J. 2000. Activity of digestive enzyme in yolk sac larvae of Atlantic halibut (*Hippoglossus hippoglossus*): indication of readiness for first feeding. *Aquaculture* 184: 303-314.
- Genten, F., Terwinghe, E. & Danguy, A. 2009. Atlas of fish histology. Science Publisher. USA. 215 p.
- Geven, E.J.W., Widow, A. Flik, G. & Klaren, P.H.M. 2009. Histological analysis of the ontogeny of thyroid tissue in early life stages of common carp (*Cyprinus carpio* L.). pp. 66-75. In *Thyroid physiology in fish*. Radboud University, Nijmegen.
- _____, Nguyen, N-K., van den Boogaart, M., Spanings, F.A.T., Flik, G. & Klaren, P.H.M. 2007. Comparative thyroidology: thyroid gland location and iodothyronine dynamics in Mozambique tilapia (*Oreochromis mossambicus* Peters) and common carp (*Cyprinus carpio* L.). *The Journal of Exp. Biol.* 210: 4005-4015.
- Gisbert, E., Giménez, G., Fernández, I., Kotzamanis, Y. & Estévez, A. 2009. Development of digestive enzymes in common dentex *Dentex dentex* during early ontogeny. *Aquaculture* 287: 381-387.
- Glamuzina, B., Skaramuca, B., Glavić, N., Kožul, V., Dulčić, J. & Kraljević, M. 1998. Egg and early larval development of laboratory reared dusky grouper, *Epinephelus marginatus* (Lowe, 1834) (Pisces, Serranidae). *Sci. Mar.* 62(4): 373-378.
- Gómez-Requeni, P., Bedolla-Cázares, F., Montecchia, C., Zorrilla, J., Villian, M., Toledo-Cuevas, E.M. & Canosa, F. 2013. Effects of increasing the dietary lipid levels on the growth performance, body composition and digestive enzyme activities of the teleost pejerrey (*Odontesthes bonariensis*). *Aquaculture* 416-417: 15-22.

- Grageda, M.V.C., Kotani, T., Sakakura, Y. & Hagiwara, A. 2008. Effects of feeding copepod and artemia on early growth and behaviour of the self-fertilizing fish, *Rivulus marmoratus*, under laboratory conditions. *Aquaculture* 281: 100-105.
- Green, B.S. & Fisher, R. 2004. Temperature influences swimming speed, growth and larval duration in coral reef fish larvae. *J. Exp. Mar. Biol. Ecol.* 299: 115-132.
- Hagiwara, A., Kotani, T., Snell, T.W., Assava-Areec, M. & Hirayama, K. 1995. Morphology, reproduction, genetics, and mating behavior of small, tropical marine *Brachionus* strains (Rotifera). *J. Exp. Mar. Biol. Ecol.* 194: 25-37.
- _____, Gallardo, W.G., Assavaaree, M., Kotani, T. & de Araujo, A.B. 2001. Live food production in Japan: recent progress and future aspects. *Aquaculture* 200: 111-127.
- Hamasaki, K., Teruya, K. & Takeuchi, H. 2003. Starvation tolerance and food intake under starved conditions in hatchery-reared juveniles of coral trout, *Plectropomus leopardus*. *Suisanzoshoku* 51(1): 65-71.
- Hamre, K., Moren, M., Solbakken, J., Opstad, I. & Pittman, K. 2005. The impact of nutrition on metamorphosis in Atlantic halibut (*Hippoglossus hippoglossus* L.). *Aquaculture* 250: 555-565.
- _____, Srivastava, A., Rønnested, I., Mangor-Jensen, A. & Stoss, J. 2008. Several micronutrients in the rotifer *Brachionus* sp. may not fulfil the nutritional requirements of marine fish larvae. *Aquaculture Nutrition* 14(1): 51-60.
- Hamza, N., Mhetli, M., Khemis, I.B., Cahu, C. & Kestemont, P. 2008. Effect of dietary phospholipid levels on performance, enzyme activities and fatty acid composition of pikeperch (*Sander lucioperca*) larvae. *Aquaculture* 275: 274-282.
- Harada, Y., Harada, S., Kinoshita, I., Tanaka, M. & Tagawa, M. 2003. Thyroid gland development in a Neotenic Goby (Ice Goby, *Leucopsarion petersii*) and a Common Goby (Ukigori, *Gymnogobius urotaenia*) during early life stages. *Zoological Science* 20(7): 883-888.
- Harrison, H.B., Williamson, D.H., Evans, R.D., Almany, G.R., Thorrold, S.R., Russ, G.R., Feldheim, K.A., van Herwerden, L., Planes, S., Srinivasan, M., Berumen, M.L. & Jones, G.P. 2012. Larval export from marine reserves and the recruitment benefit for fish and fisheries. *Current Biology* 22:1023-1028.
- Hawkyard, M., Sæle, Ø., Nordgreen, A., Langdon, C. & Hamre, K. 2011. Effect of iodine enrichment of Artemia sp. on their nutritional value for larval zebrafish (*Danio rerio*). *Aquaculture* 316: 37-43.
- Hazon, N. & Balment, R.J. 1997. Endocrinology. pp. 441-463. *In* The physiology of fishes 2nd ed. CRC Press. New York.
- Heath, M.R. 2007. The consumption of zooplankton by early life stages of fish in the North Sea. *ICES Journal of Marine Science* 64: 1650-1663.
- Heemstra, P.C. & Randall, J.E. 1993. pp. 292-293. *In* FAO Species Catalogue 16. Rome.

- Heyland, A. & Moroz, J.J. 2005. Cross-kingdom hormonal signaling: an insight from thyroid hormone functions in marine larvae. *The Journal of Experimental Biology* 208: 4355-4361.
- Hepher, B. 1988. Nutrition of pond fishes. Cambridge University press, Cambridge, New York. 388 p.
- Hickman, C. P. Jr., Robert, L.S. & Larson, A. 1998. Role of enzyme. pp. 40-42 *In* Biology of animals. 7th ed. WBC/McGraw-Hill.USA.
- Hill, R.W., Wyse, G.A. & Anderson, M. 2004. Endocrine and neuroendocrine physiology. pp. 389-422. *In* Animal physiology. Sinaeur Associates Inc. USA.
- Hoehne-Reitan, K., Kjørsvik, E. & Reitan, K.I. 2001. Bile salt-dependent lipase in larval turbot, as influenced by density and lipid content of fed prey. *J. Fish Biol.* 58(3): 746-754.
- Hossain, M.A., Rahman, M.S. & Furuichi, M. 2007. Enrichment of rotifer *Brachionus rotundiformis* with calcium. *Bangladesh Fish. Res.* 11(1): 51-56.
- Hotta, Y., Aritaki, M., Tagawa, M. & Tanaka, M. 2001. Changes in tissue thyroid hormone levels of metamorphosing spotted halibut *Verasper variegates* reared at different temperatures. *Fish. Sci.* 67:1119-1124.
- Hubenova, T., Zaikov, A., Vasileva, P. & Piskov, I. 2010. Growth and survival of pike larvae *Esox lucius* L. fed on brine shrimp (*Artemia salina* L.) nauplii. *Bulg. J. Agric. Sci.* 16: 394-397.
- Imbert, H., Arrowsmith, R., Dufour, S. & Elie, P. 2008. Relationships between locomotor behavior, morphometric characters and thyroid hormone levels give evidence of stage-dependent mechanisms in European eel upstream migration. *Hormones and Behavior* 53: 69-81.
- Infante, J.Z. & Cahu, C. 2001. Ontogeny of the gastrointestinal tract of marine fish larvae. *Comp. Biochem. Physiol. C* 130: 477-487.
- Inouye, M. 1976. Differential staining of cartilage and bone in fetal mouse skeleton by alcian blue and alizarin red S. *Cong. Anom.* 16: 171-173.
- Inui, Y. & Miwa, S. 1985. Thyroid hormone induces metamorphosis of flounder larvae. *Gen Comp Endocrinol.* 60(3): 450-454.
- _____, Yamano, K. & Miwa, S. 1995. The role of thyroid hormone in tissue development in metamorphosing flounder. *Aquaculture* 135: 87-98.
- Ismi, S., Wardoyo, Setiawati, K.M., Hutapea, J.H. & Aslianti, T. 2000. Penggunaan copepod *Acartia* sp. sebagai makanan pada pemeliharaan larva kerapu bebek (*Cromileptes altivelis*). *J. Penelit. Perikanan Indonesia* 6(1): 19-23.
- Itoh, H., Tachibana, A., Nomura, H., Tanaka, Y., Furota, T. & Ishimura, T. 2011. Vertical distribution of planktonic copepods in Tokyo Bay in summer. *Plankton Benthos Res.* 6(2): 129-134.
- Iwata, M., Yamanome, T., Tagawa, M., Ida, H. & Hirano, T. 1989. Effects of thyroid hormones on phototaxis of chum and coho salmon juveniles. *Aquaculture* 82(1-4): 329-338.
- Johnson, G.B. 1997. Chemical signaling within the body. pp. 521-533. *In* The living world. McGraw-Hill.

- John, J.S. 1999. Ontogenetic changes in the diet of the coral reef grouper *Plectropomus leopardus* (Serranidae): patterns in taxa, size and habitat of prey. *Mar. Ecol. Prog. Ser.* 180: 233-246.
- Kailasam, M., Thirunavukkarasu, A.R., Selvaraj, S. & Stalin, P. 2007. Effect of delayed initial feeding on growth and survival of Asian sea bass *Lates calcarifer* (Bloch) larvae. *Aquaculture* 271(1-4): 298-306.
- Kamaci, H.O., Suzer, C., Coban, D., Firat, K. & Saka, S. 2009. Organogenesis and enzymatic functionality of exocrine pancreas in cultured Gilthead Sea Bream (*Sparus auratus*) larvae. *J. Anim. Vet. Adv.* 8(12): 2477-2484.
- Kang, D-Y. & Chang, Y.J. 2004. Effects of maternal injection of 3,5,3'-triiodo-L-thyronine (T3) on growth of newborn offspring of rockfish, *Sebastes schlegel*. *Aquaculture* 234: 641-655.
- Kang, J-H. 2011. The occurrence of *Acartia* species and their environmental characteristics at three ports in Korea. *Ocean Sci. J.* 46(4): 219-237.
- Kardong, K.V. 2012. The endocrine system. pp. 592-624. In *Vertebrates comparative anatomy, function, evolution* 6th ed. McGraw Hill.
- Kawakami, Y., Nozaki, J., Seoka, M., Kumai, H. & Ohta, H. 2008a. Characterization of thyroid hormones and thyroid hormone receptors during the early development of Pacific bluefin tuna (*Thunnus orientalis*). *Gen. Comp. Endocrinol.* 155: 597-606.
- _____, Yokoi, K., Kumai, H. & Ohta, H. 2008b. The role of thyroid hormones during the development of eye pigmentation in the Pacific bluefin tuna (*Thunnus orientalis*). *Comp. Biochem. Physiol., B* 150: 112-116.
- Kay, I. 1998. Endocrine function. pp. 55-71. In *Introduction to animal physiology*. BIOS Scientific. UK.
- Khalil, N.A., Allah, H.M.M.K. & Mousa, M.A. 2011. The effect of maternal thyroxine injection on growth, survival and development of the digestive system of Nile tilapia, *Oreochromis niloticus*, larvae. *Advances in Bioscience and Biotechnology* 2: 320-329.
- Kim, B.G. & Brown, C.L. 1995. Hormonal manipulation of digestive enzyme ontogeny in marine larval fishes-Effects on digestive enzymes. UJNR Technical Report No. 28. 47-55 pp.
- Klaren, P.H.M., Wunderink, Y.S., Yúfera, M., Mancera, J.M. & Flik, G. 2008. The thyroid gland and thyroid hormones in Senegalese sole (*Solea senegalensis*) during early development and metamorphosis. *Gen. Comp. Endocrinol.* 155: 686-694.
- Kline, M.D. & Laidley, C.W. 2015. Development of intensive copepod culture technology for *Parvocalanus crassirostris*: Optimizing adult density. *Aquaculture* 435: 128-136.
- Klingenberg, C.P. 1996. A combined morphometric and phylogenetic analysis of an ecomorphological trend: pelagization in Antarctic fishes (Perciformes: Nototheniidae). *Biological Journal of the Linnean Society* 59: 143-177.
- Koeshendrajana, S. & Hartono, T.T. 2006. Indonesian live reef fish industry: status, problems and possible future direction. pp. 74-86. In Johnston &

- Yeeting (Eds.). Proceedings of Economic and marketing of the live reef fish trade in Asia-Pacific. ACIAR.
- Kohno, H., Diani, S., Sunyoto, P., Slamet, B. & Imanto, P.T. 1990. Early development events associated with changeover of nutrient sources in the grouper, *Epinephelus fuscoguttatus*, larvae. Bull. Pen. Perikanan, special eds. 1: 51-64.
- _____, Ordonio-Aguilar, Ohno, A. & Taki, Y. 1997. Why is grouper larval rearing difficult?: an approach from the development of the feeding apparatus in early stage larvae of the grouper, *Epinephelus coioides*. *Ichthyol. Res.* 44(3): 267-274.
- Kline, M.D. & Laidley, C.W. 2015. Development of intensive copepod culture technology for *Parvocalanus crassirostris*: Optimizing adult density. *Aquaculture* 435: 128-136.
- Kolkovski, S., Tandler, A. & Izquierdo, M.S. 1997. Effects of live food and dietary digestive enzymes on the efficiency of microdiets for seabass (*Dicentrarchus Labrax*) larvae. *Aquaculture* 148: 313-322.
- _____. 2001. Digestive enzymes in fish larvae and juveniles-implications and applications to formulated diets. *Aquaculture* 200: 181-201.
- Komarudin, U., Prihaningrum, A. & Arifin, Z. 1998. Pemeliharaan larva kerapu macan (*Epinephelus fuscoguttatus*) dengan multi-spesies zooplankton. pp. 142-148. Dalam Sudradjat *et al.* (Ed). Seminar Teknologi Perikanan Pantai.
- Kraul, S. 1989. Production of live prey for marine fish larvae. *Advances in Tropical Aquaculture*. 95-607.
- _____. 2006. Live food for marine fish larvae. pp. 55-61. In Suárez, L.E.C. *et al.* (Eds). Simposium Internacional de Nutrición Acuicola. Mexico.
- Kupren, K., Mamcarz, A., Kucharczyk, D. & Prusińska, M. 2008. Changes in morphometric parameters in selected early ontogenic stages of three fish species from the genus *Leuciscus* (Teleostei, Cyprinidae). *Arch. Pol. Fish* 16(4): 421-436.
- Kurokawa, T. & Suzuki, T. 1996. Formation of the diffuse pancreas and the development of digestive enzyme synthesis in larvae of the Japanese flounder *Paralichthys olivaceus*. *Aquaculture* 141: 267-276.
- _____, Shiraishi, M. & Suzuki, T. 1998. Quantification of exogenous protease derived from zooplankton in the intestine of Japanese sardine (*Sardinops melanotictus*) larvae. *Aquaculture* 161: 491-499.
- _____, Suzuki, Ohta, H., Kagawa, H., Tanaka, T. & Unuma, T. 2002. Expression of pancreatic enzyme genes during the early larval stage of Japanese eel *Anguilla japonica*. *Fish. Sci.* 68: 736-744.
- Kuz'mina, V.V. & Golovanova, L.L. 2004. Contribution of prey proteinases and carbohydrases in fish digestion. *Aquaculture* 234: 347-360.
- Lam, T.J. 1980. Thyroxine enhances larval development and survival in *Sarotherodon (Tilapia) mossambicus* ruppell. *Aquaculture* 21: 287-291.
- _____, Juario, J.V. & Banno, J. 1985. Effect of thyroxine on growth and development in post-yolk-sac larvae of milkfish *Chanos chanos*. *Aquaculture* 46: 179-184.

- Lauff, M. & Hoffer, R. 1984. Proteolytic enzymes in fish development and the importance of dietary enzymes. *Aquaculture* 37: 335-346.
- Lavens, P. & Sorgeloos, P. 1996. Manual on the production and use of live food for aquaculture. FAO Fisheries Technical Paper. No. 301. 295 p.
- Lazo, J.P., Holt, G.J. & Arnold, C.R. 2000. Ontogeny of pancreatic enzymes in larval red drum *Sciaenops ocellatus*. *Aquaculture Nutrition* 6: 183-192.
- _____, Mendoza, R., Holt, G.J., Aguilera, C. & Arnold, C.R. 2007. Characterization of digestive enzymes during larval development of red drum (*Sciaenops ocellatus*). *Aquaculture* 265: 194-205.
- Le, Y., Sheng-Yun, Y., Xiao-Ming, Z., Min, L., Jing-Yi, J. & Kai-Chang, W. 2011. Effects of temperature on survival, development, growth and feeding of larvae of Yellowtail clownfish *Amphiprion clarkii* (Pisces: Perciformes). *Acta Ecologica Sinica* 31: 241-245.
- Lehtiniemi, M., Hakala, T., Saesmaa, S. & Viitasalo, M. 2007. Prey selection by the larvae of three species of littoral fishes on natural zooplankton assemblages. *Aquat. Ecol.* 41: 85-94.
- Lemieux, H., Blier, P. & Dutil, J.D. 1999. Do digestive enzymes set a physiological limit on growth rate and food conversion efficiency in the Atlantic cod (*Gadus morhua*)? *Fish Physiol. and Biochem.* 20: 293-303.
- Lemos, D., Hernández-Cortés, M.P., Navarrete, A., Garcia-Carreño, F.L. & Phan, V. N. 1999. Ontogenetic variation in digestive proteinase activity of larvae and postlarvae of the pink shrimp *Farfantepenaeus paulensis* (Crustacea: Decapoda: Penaeidae). *Mar. Biol.* 135:653-662.
- Lewis, R. 1998. Digestion and nutrition. pp. 749-768 *In* Life. 3rd ed. McGraw-Hill.
- Lin, K-J., Hsu, C-K., Su, S-C., Chang, T-Y. & Liu, S-H. 2014. The larval culture of coral trout (*Plectropomus leopardus*). *J. Taiwan Fish. Res.* 22: 45-55.
- Linfield, W.M., Barankas, R.A., Sivieri, L., Serota, S. & Stevenson, R.W. 1984. Enzymatic fat and synthesis. *JAOCs* 18(2): 78-87.
- Lo, W-T, Chung, C-L. & Shih, C-t. 2004. Seasonal distribution of copepods in Tapong Bay, Southwestern Taiwan. *Zoological Studies* 43(2): 464-474.
- Losos, J.B., Mason, K.A., Singer, S.R., Raven, P.H. & Johnson, G.B. 2008. The endocrine system. pp. 919-942. *In* Biology 8th ed. McGraw Hill Companies Inc.
- Lubzen, E., Tandler A. & Minkoff, G. 1989. Rotifer as food in aquaculture. *Hydrobiologia*. 186/187: 399-400.
- _____, & Zmora, O. 2003. Production and nutritional value of rotifers. pp. 17-64. *In* Støttrup, J.G. & McEvoy, L.A. (Eds). *Life feeds in marine aquaculture*. Blackwell Science Ltd.
- Luizi, F.S., Gara, B. Shields, R.J. & Bromage, N.R. 1999. Further description of the development of the digestive organs in Atlantic halibut (*Hippoglossus hippoglossus*) larvae, with notes on differential absorption of copepod and *Artemia* prey. *Aquaculture* 176: 101-116.
- Luquet, G. 2012. Biomineralizations: insights and prospects from crustaceans. *ZooKeys* 176: 103-121.

- Ma, H., Cahu, C., Zambonino, J., Yu, H., Duan, Q., Le Gall, M. & Mai, K. 2005. Activities of selected digestive enzymes during larval development of large yellow croaker (*Pseudosciaena crocea*). *Aquaculture* 245: 239-248.
- Ma, Z., Guo, H., Zhang, N. & Bai, Z. 2013. State of art for larval rearing of grouper. *International Journal of Aquaculture* 3(13): 63-72.
- MacKenzie, B.R., Leggett, C., Peters, R.H. 1990. Estimating larval fish ingestion rates: can laboratory derived values be reliably extrapolated to the wild? *Mar. Ecol. Prog. Ser.* 67: 209-225.
- Mader, S.S. 2001. Metabolism: energy and enzymes. pp. 97-111. In *Biology*. 7th ed. McGraw-Hill. New York.
- Maiphae, S. & Sa-ardrit, P. 2011. Marine copepods at Mo Ko Thale Tai, Gulf of Thailand. *Songklanakarin J. Sci. Technol.* 33(6): 641-651.
- Mamauag, S.S., Donaldson, T.J., Pratt, V.R. McCullough. B. 2000. Age and size structure of the leopard coral grouper *Plectropomus leopardus* (Serranidae: Epinephelinae), in the live reef fish trade of the Philippines. pp. 649-656. In Moosa, M.K. *et al* (Eds) *Proceedings 9th International Coral Reef Symposium 2*. Bali.
- Manchado, M., Infante, C., Asensio, W., Planas, J.V., Cañavate, J.P. 2008. Thyroid hormones down-regulate thyrotropin b subunit and thyroglobulin during metamorphosis in the flatfish Senegalese sole (*Solea senegalensis* Kaup). *Gen. Comp. Endocrinol.* 155: 447-455.
- Mason, K.A., Losos, J.B. Singer S.R. 2011a. Cell communication. pp. 168-185. In *Biology* 9th ed. McGraw-Hill Companies Inc. New York.
- _____, Losos, J.B. & Singer, S.R. 2011b. The endocrine system. pp. 937-960. In *Biology* 9th ed. McGraw-Hill Companies Inc. New York.
- Masuda, R. 2003. The critical role of docosahexaenoic acid in marine and terrestrial ecosystems: from bacteria to human behavior. pp. 249-256. In *Proceedings of the 26th Annual Larval Fish Conference*.
- Masuma, S., Tezuka, N. & Teruya, K. 1993. Embryonic and morphological development of larval and juvenile coral trout, *Plectropomus leopardus*. *Japan J. Ichtyol* 40(3): 333-342.
- Matty, A.J. 1985. *Fish endocrinology*. Timber press. 267 p.
- Mazepova, G.F. 1998. The role of copepods in the Baikal ecosystem. *J. Marine Systems* 15: 113-120.
- McBride, S. 2004. The activity of digestive enzymes in larval grouper and live feed. pp. 41-46. In *Rimmer, M.A. et al.*, (Eds). *Advances in grouper aquaculture*. Canberra.
- McComb, D.M., Gelsleichter, J., Manire, C.A., Brinn, R. & Brown, C.L. 2005. Comparative thyroid hormone concentration in maternal serum and yolk of the bonnethead shark (*Sphyrna tiburo*) from two sites along the coast of Florida. *Gen. Comp. Endocrinol.* 144: 167-173.
- McEvoy, L.A., Naess, T., Bell, J.G. & Lie, Ø. 1998. Lipid and fatty acid composition of normal and malpigmented Atlantic halibut (*Hippoglossus hippoglossus*) fed enriched *Artemia*: a comparison with fry fed wild copepods. *Aquaculture* 163: 237-250.

- McKinnon, A.D., Duggan, S., Nichols, P.D., Rimmer, M.A., Semmens, G. & Robino, B. 2003. The potential of tropical paracalanid copepods as live feeds in aquaculture. *Aquaculture* 223: 89-106.
- McLean, D.L., Harvey, E.S. & Meeuwig, J.J. 2011. Declines in the abundance of coral trout (*Plectropomus leopardus*) in areas closed to fishing at the Houtman Abrolhos Islands, Western Australia. *J. Exp. Mar. Biol. Ecol.* 406: 71-78.
- Melianawati, R. & Imanto, P.T. 2004. Pemilihan pakan alami larva ikan kakap merah *Lutjanus sebae*. *J. Penelit. Perikanan Indonesia* 10(1): 21-24.
- _____, Andamari, R. & Imanto, P.T. 2006a. Aktivitas makan harian larva ikan kerapu sunu (*Plectropomus leopardus*). pp. 266-274. *Dalam* Murwantoko *et al.* (Ed). Prosiding Seminar Nasional Tahunan III Hasil Penelitian Perikanan dan Kelautan, Universitas Gadjah Mada. Yogyakarta.
- _____, Andamari, R. & Suwiryana, K. 2006b. Penggunaan kuning telur ayam sebagai alternatif pakan awal bagi larva ikan kerapu sunu (*Plectropomus leopardus*). *J. Aquacultura Indonesia* 7(1): 27-35.
- _____, Suwiryana, K. & Andamari, R. 2007. Upaya pemeliharaan larva kerapu sunu (*Plectropomus leopardus*). pp. 408-414. *Dalam* Achmad *et al.* (Ed). Buku "Pengembangan Teknologi Budidaya Perikanan", Pusat Riset Perikanan Budidaya. Jakarta.
- _____, & Andamari, R. 2010. Pengaruh perbedaan jenis bahan pengkaya pada rotifer (*Brachionus rotundiformis*) terhadap aktivitas enzim pencernaan dan pertumbuhan larva ikan kerapu sunu *Plectropomus leopardus*. *Aquacultura Indonesia* 11(2): 105-111.
- _____, & Suwiryana, K. 2010. Optimasi tingkat pemberian pakan terhadap benih kerapu sunu (*Plectropomus leopardus*). pp. 659-665. *Dalam* Sudradjat, A. *et al.* (Ed). Prosiding Forum Inovasi Teknologi Akuakultur, Buku 2.
- _____, & Astuti, N.W.W. 2012. *J. Riset Akuakultur* 7(3): 421-428.
- _____, Pratiwi, R. & Astuti, N.W.W. 2012a. Pengaruh perbedaan waktu awal pemberian pakan buatan terhadap pertumbuhan dan aktivitas enzim pencernaan larva ikan kerapu bebek *Cromileptes altivelis* (Valenciennes 1828). *J. Biologi Indonesia* 4(2): 329-342.
- _____, Astuti, N.W.W. & Suwiryana, K. 2012b. Produksi benih kerapu sunu *Plectropomus leopardus* di Balai Besar Penelitian dan Pengembangan Budidaya Laut. pp. 139-148. *Dalam* Haryanti *et al.* (Ed). Prosiding Indoaqaua-Forum Inovasi Teknologi Akuakultur.
- _____, Astuti, N.W.W. & Suwiryana, K. 2013. The use of copepods to improve juveniles production of coral trout *Plectropomus leopardus* (Lacepede, 1802). *Middle-East J. Sci. Res.* 16(2): 237-244.
- Mitra, G., Mukhopadhyay, P.K. & Ayyappan, S. 2008. Modulation of digestive enzyme activities during ontogeny of *Labeo rohita* larvae fed ascorbic acid enriched zooplankton. *Comp. Biochem. Physiol. A* 149: 341-350.
- Miwa, S. & Inui, Y. 1987. Effects of various doses of thyroxine and triiodothyronine on the metamorphosis of flounder (*Paralichthys olivaceus*). *Gen. Comp. Endocrinol.* 67(3): 356-363.

- _____, Tagawa, M., Inui, Y. & Hirano, T. 1988. Thyroxine surge in metamorphosing flounder larvae. *Gen Comp. Endocrinol.* 70(1): 158-163.
- Monteleone, D.M. & Peterson, W.T. 1986. Feeding ecology of American sand lance *Ammodytes americanus* larvae from Long Island Sound. *Mar. Ecol. Prog. Ser.* 30: 133-143.
- Moren, M., Opstad, I., van Der Meeren, T. & Hamre, K. 2006. Iodine enrichment of *Artemia* and enhanced levels of iodine in Atlantic halibut larva (*Hippoglossus hippoglossus* L.) fed the enriched *Artemia*. *Aquaculture Nutrition* 12(2): 97-102.
- _____, Sloth, J.J. & Hamre, K. 2008. Uptake of iodide from water in Atlantic halibut larvae (*Hippoglossus hippoglossus* L.). *Aquaculture* 285: 174-178.
- Mori, K., Yamamoto, K., Teruya, K., Shiozawa, S., Yoseda, K., Sugaya, T., Shirakashi, S., Itoh, N. & Ogawa, K. 2007. Endoparasitic dinoflagellate of the genus *Ichthyodinium* infecting fertilized eggs and hatched larvae observed in the seed production of leopard coral grouper *Plectropomus leopardus*. *Fish pathology* 42(1): 49-57.
- Morote, E., Olivar, M.P., Bozzano, A., Villate, F. & Uriarte, I. 2011. Feeding selectivity in larvae of the European hake (*Merluccius merluccius*) in relation to ontogeny and visual capabilities. *Mar. Biol.* 158: 1349-1361.
- Mousseau, L., Fortier, L. & Legendre, L. 1998. Annual production of fish larvae and their prey in relation to size-fractionated primary production (Scotian Shelf, NW Atlantic). *ICES J. Mar. Sci.* 55: 44-57.
- Mulyadi & Sidabalok, C.M. 2010. Pengaruh musim terhadap keragaman dan kelimpahan kopepoda (krustacea) di perairan mangrove estuary T.N. Ujung Kulon, Banten. *Berk. Penel. Hayati* 15: 191-197.
- _____, & Rumengan, I.F.M. 2012. Zooplankton research in Indonesia waters: A historical review. *Coastal Mar. Sci.* 35(1): 202-207.
- Munilla-Moran, R. & Stark, J.R. 1989. Protein digestion in early turbot larvae, *Scophthalmus maximus* (L.). *Aquaculture* 81: 315-327.
- _____, Stark, J.R. & Barbour, A. 1990. The role of exogenous enzymes in digestion in cultured turbot larvae (*Scophthalmus maximus* L.). *Aquaculture* 88: 337-350.
- Munk, P. & Kiørboe, T. 1985. Feeding behaviour and swimming activity of larval herring (*Clupea harengus*) in relation to density of copepod nauplii. *Mar. Ecol. Prog. Ser.* 24: 15-21.
- Musa, S.M., Aura, C.M., Ngugi, C.C. & Kundu, R. 2012. The effect of three different feed types on growth performance and survival of African catfish fry (*Clarias gariepinus*) reared in a hatchery. *ISRN Zoology Article ID* 861364.
- Nacario, J.F. 1983. The effect of thyroxine on the larvae and fry of *Sarotherodon niloticus* L. (*Tilapia nilotica*). *Aquaculture* 34: 73-83.
- Nanton, D.A. & Castell, J.D. 1998. The effects of dietary fatty acids on the fatty acid composition of the harpacticoid copepod, *Tisbe* sp., for use as a live food for marine fish larvae. *Aquaculture* 163: 251-261.

- Navarro-Guillén, C., Moyano, F.J. & Yúfera, M. 2015. Diel food intake and digestive enzyme production patterns in *Solea senegalensis* larvae. *Aquaculture* 435: 33-42.
- Nayak, P.K., Mahapatra, C.T., Mishra, J. & Mishra, T.K. 2000. Effect of treatment of eggs with thyroxin and cortisol on larval morphometry and survival in the freshwater carp, *Catla catla* (Ham.). *Indian J. Fish* 47(4): 337-342.
- _____, Satpathy, B.B., Mishra, T.K. & Ayyappan, S. 2001. Thyroid hormones dynamics during early development in freshwater catfish, *Heteropneustes fossilis* (Bloch). *Indian J. Fish* 48(4): 403-408.
- Nelson, G.E. & Robinson, G.G. 1982. Digestion, transport and respiration. pp. 95-112. *In* Fundamental concepts of biology 4th ed. John Wiley and Sons.
- Nielsen, T.G. & Munk, P. 1998. Zooplankton diversity and the predatory impact by larval and small juvenile fish at the Fisher Banks in the North Sea. *J. Plankton Res.* 20(12): 2313-2332.
- Nordgreen, A., Penglase, S. & Hamre, K. 2013. Increasing the levels of the essential trace elements Se, Zn, Cu and Mn in rotifers (*Brachionus plicatilis*) used as live feed. *Aquaculture* 380-383: 120-129.
- Nybakken, J.W. & Bertness, M.D. 2005. Marine Biology an ecological approach. 6th ed. Pearson Education, Inc., Publishing.
- Ojima, D. & Iwata, M. 2007. The relationship between thyroxine surge and onset of downstream migration in chum salmon *Oncorhynchus keta* fry. *Aquaculture* 273: 185-193.
- Okada, N., Tanaka, M. & Tagawa, M. 2003. Bone development during metamorphosis of the Japanese flounder (*Paralichthys olivaceus*): differential responses to thyroid hormone. pp. 177-187. *In* Browman, H.I. & Skiftesvik, A.B. (Eds). The Big Fish Bang, Proceedings of the 26th Annual Larval Fish Conference, Norway.
- _____, Morita, T., Tanaka, M. & Tagawa, M. 2005. Thyroid hormone deficiency in abnormal larvae of the Japanese flounder *Paralichthys olivaceus*. *Fish. Sci.* 71: 107-114.
- Okauchi, M., Zhou, W. & Zou, W. 1990. Difference in nutritive value of a microalga *Nannochloropsis oculata* at various growth phases. *Nippon Suisan Gakkaishi* 56: 1293-1298.
- _____. 2004. An assessment of the beneficial roles of *Nannochloropsis oculata* in larval rearing of marine finfish. *Bull. Fish. Res. Agen. Supplement* 1. 83-90.
- Oliveira, R.F. & Almada, V.C. 1995. Sexual dimorphism and allometry of external morphology in *Oreochromis mossambicus*. *J. Fish Biol.* 46: 1055-1064.
- Olivotto, L., Buttino, I., Borroni, M., Piccinetti, C.C., Malzone, M.G. & Carnevali, O. 2008. The use of the Mediterranean calanoid copepod *Centropages typicus* in Yellowtail clownfish (*Amphiprion clarkii*) larviculture. *Aquaculture* 284: 211-216.

- Olsen, A.I., Attramadal, Y., Reitan, K.I. & Olsen, Y. 2000. Food selection and digestion characteristics of Atlantic halibut (*Hippoglossus hippoglossus*) larvae fed cultivated prey organisms. *Aquaculture* 181: 293-310.
- Pan, L., Xiao, Q., Zhang, H. & Luan, Z. 2005. Effect of different dietary protein content on growth and protease activity of *Eriocheir sinensis* larvae. *Aquaculture* 246: 313-319.
- Para, G. & Yüfera, M. 2000. Feeding, physiology and growth responses in first-feeding gilthead seabream (*Sparus aurata* L.) larvae in relation to prey density. *J. Exp. Mar. Biol. Ecol.* 243: 1-15.
- Park, H.G., Puvanendran, V., Kellett, A., Parrish, C.C. & Brown, J.A. 2006. Effect of enriched rotifers on growth, survival, and composition of larval Atlantic cod (*Gadus morhua*). *ICES J Mar. Sci.* 63: 285-295.
- Park, J.M., Cho, J.K., Han, H. & Han, K.H. 2015. Morphological and skeletal development and larvae and juvenile of *Sebastes koreanus* (Pisces: Scorpaenidae). *Korean Journal of Ichthyology* 27(1): 1-9.
- Payne, M.F., Rippingale, R.J. & Cleary, J.J. 2001. Cultured copepods as food for West Australian dhufish (*Glaucosoma hebraicum*) and pink snapper (*Pagrus auratus*) larvae. *Aquaculture* 194: 137-150.
- Pedersen, B.H. 1984. The intestinal evacuation rates of larval herring (*Clupea harengus* L.) predating on wild plankton. *Dana* 3: 21-30.
- _____. 1993. Protein digestion in herring *Clupea harengus* larvae: trypsinogen secretion and effect of a transitory food restriction on mortality, growth and digestive enzyme content. pp. 220-225. In Walter, B.T. & Fyhn, H.J. Physiological and biochemical aspect of fish development.
- _____, Ueberschär, B. & Kurokawa, T. 2003. Digestive response and rates of growth in pre-leptocephalus larvae of the Japanese eel *Anguilla japonica* reared on artificial diets. *Aquaculture* 215: 321-338.
- Peña-Aguado, F., Nandini, S. & Sarma, S.S.S. 2005. Differences in population growth of rotifers and cladocerans raised on algal diets supplemented with yeast. *Limnologica* 35: 298-303.
- Penglase, S., Harboe, T., Sæle, Ø., Helland, S., Nordgreen, A. & Hamre, K. 2013. Iodine nutrition and toxicity in Atlantic cod (*Gadus morhua*) larvae. *PeerJ* 1:e20.
- Perez-Casanova, J.C., Murray, H.M., Gallant, J.W., Ross, N.W., Douglas, S.E. & Johnson, S.C. 2006. Development of the digestive capacity in larvae of haddock (*Melanogrammus aeglefinus*) and Atlantic cod (*Gadus morhua*). *Aquaculture* 251: 377-401.
- Phillips, M. & Yuan, Y. 1998. Summary report on a recent survey of marine fish aquaculture and live fish markets in China. pp. 38-41. In Rimmer *et al.* (Eds.). Proceedings Grouper Aquaculture Research Workshop. ACIAR.
- Plohman, J.C., Dick, T.A. & Eales, J.G. 2002. Thyroid of Lake Sturgeon, *Acipenser fulvescens*. *Gen. Comp. Endocrinol.* 125: 47-55.
- Power, D.M., Llewellyn, L., Faustino, M., Nowell, M.A., Björnsson, B.Th., Einarsdóttir, I.E., Canario, A.V.M. & Sweeney, G.E. 2001. Thyroid

- hormones in growth and development of fish. *Comp. Biochem. Physiol. C* 130: 447-459.
- Prijono A., Aslianti, T. & Asmanik. 2008. Pemberian jenia pakan awal berbeda terhadap pola tumbuh dan sintasan larva ikan cobia (*Rachycentron canadum*). pp. 321-327. *Dalam Buku Teknologi Perikanan Budidaya*.
- Purves, W.K., Orians, G.H. & Heller, H.C. 1992. Animal nutrition. pp. 935-961. *In Life: the science of biology*. Sinauer Assc.
- Rabe, J. & Brown, J.A. 2000. A pulse feeding strategy for rearing larval fish: an experiment with yellowtail flounder. *Aquaculture* 191: 289-302.
- Rahardjo, M.T., Sjafei. D.S., Affandi, R. & Sulistiono. 2011. Iktiologi. Lubuk Agung. Bandung. 396 p.
- Raine, J.C. & Leatherland, J.F. 1999. Ontogeny of thyroid tissue and tissue thyroid hormone clearance in rainbow trout embryos reared at two temperatures. *Fish. Physiol. Biochem.* 20: 209-217.
- Rajkumar, M. & Vasagam, K.P.K. 2006. Suitability of the copepod, *Acartia clausi* as a live food for seabass larvae (*Lates calcarifer* Bloch): Compared to traditional live-food organisms with special emphasis on the nutritional value. *Aquaculture* 261: 649-658.
- Raven, P.H. & Johnson, G.B. 1999. The Endocrine system. pp. 1045-1066. *In Biology* 5th. International ed. McGraw-Hill Company.
- Reddy, P.K. & Lam, T.J. 1992. Effect of thyroid hormones on morphogenesis and growth of larvae and fry of telescopic-eye black goldfish *Carrassius auratus*. *Aquaculture* 107: 383-394.
- Ribeiro, L., Sarasquete, C. & Dinis, M.T. 1999a. Histological and histochemical development of the digestive system of *Solea senegalensis* (Kaup, 1858) larvae. *Aquaculture* 171: 293-308.
- _____, Zambonino-Infante, J.L., Cahu, C. & Dinis, M.T. 1999b. Development of digestive enzymes in larvae of *Solea senegalensis*, Kaup 1858. *Aquaculture* 179: 465-473.
- Rice, J.A., Miller, T.J., Rose, K.A., Crowder, L.B., Marschall, E.A., Trebitz, A.S. & DeAngelis, D.L. 1993. Growth rate variation and larval survival: inferences from an individual-based size-dependent predation model. *Ca. J. Fish. Aquat. Sci.* 50: 133-142.
- Rimmer, M.A. & Redd, A. 1989. Effects of nutritional enhancement of live food organisms on growth and survival of Barramundi/Seabass *Lates calcarifer* (Bloch) larvae. *Advances in tropical aquaculture*. 611-623.
- _____, M.O'Sullivan, Gillespie, J., Young, C., Hinton, A. & Rhodes, J. 1997. Grouper aquaculture in Australia. *SPC Live Reef Fish Information Bull.* 3:15-23.
- Røsnestad, I., Finn, R.N. Groot, E.P. & Fhyn, H.J. 1992. Utilization of free amino acids related to energy metabolism of developing eggs and larvae of lemon sole *Microstomus kitt* reared in the laboratory. *Mar. Ecol. Prog. Ser.* 88: 195-205.
- Rose, A., Carruthers, A-M., Stauber, J., Lim, R. & Blockwell, S. 2006. Development of an acute toxicity test with the marine copepod *Acartia sinjiensis*. *Australian J. of Ecotoxicology* 12: 73-81.

- Rusdi, I. 1997. Pertumbuhan populasi rotifer (*Brachionus rotundiformis*) type-S pada suhu yang berbeda di laboratorium. *J. Penelt. Perikanan Indonesia* 3(4): 62-66.
- Rusyani, E., Anindiasuti, Wahyuni, K.A. & Sudjiharno. 2003. Nauplius *Tigriopus* sp. sebagai alternatif pakan awal kerapu sunu dan napoleon. *Bull. Budidaya Laut* 15: 20-27.
- Sakaguchi, S.O., Ueda, H., Ohtsuka, S., Soh, H.Y. & Yoon, Y.H. 2011. Zoogeography of planktonic brackish-water calanoid copepods in western Japan with comparison with neighboring Korean fauna. *Plankton Benthos Res.* 6(1): 18-25.
- Salamat, N., Havasi, M., Majd, N.E. & Savari, A. 2012. Seasonal changes of morphometric structure and plasma hormone levels of thyroid gland in Persian Gulf yellowfin seabream (*Acanthopagrus latus*). *World J. of Fish & Mar. Sci.* 4(1): 37-41.
- Samoilys, M.A. 1997. Periodicity of spawning aggregations of coral trout *Plectropomus leopardus* (Pisces: Serranidae) on the northern Great Barrier Reef. *Mar. Ecol. Prog. Ser.* 160: 149-159.
- Sargent, J., McEvoy, L., Estevez, A., Bell, G., Bell, M., Henderson, J. & Tocher, D. 1999. Lipid nutrition of marine fish during early development: current status and future directions. *Aquaculture* 179: 217-229.
- Savona, B., Tramati, C. & Mazzola, A. 2011. Digestive enzymes in larvae and juveniles of farmed Sharpsnout Seabream (*Diplodus puntazzo*) (Cetti, 1777). *The Open Mar. Bio. J.* 5: 47-57.
- Schipp, G.R., Bosmans, J.M.P. & Marshall, A.J. 1999. A method for hatchery culture of tropical calanoid copepods, *Acartia* spp. *Aquaculture* 174: 81-88.
- Schmidt-Nielsen, K. 1998. Hormon control. pp. 487-531. *In: Animal physiology, adaptation and environment* 5th ed. Cambridge University Press.
- Schmitt, P.D. 1986. Prey size selectivity and feeding rate of larvae of the northern anchovy *Engraulis mordax* Girard. *CalCOFI Rep.* 27: 153-161.
- Schmidt, F. & Braunbeck, T. 2011. Alterations along the hypothalamic-pituitary-thyroid axis of the zebrafish (*Danio rerio*) after exposure to propylthiouracil. *J. of Thyroid Research*. ID 376243. 17 p.
- Schreiber, A.M., Wang, X., Tan, Y., Sievers, Q., Sievers, B., Lee, M. & Burrall, K. 2010. Thyroid hormone mediates otolith growth and development during flatfish metamorphosis. *Gen. Comp. Endocrinol* 169: 130-137.
- Segers, H. 2007. Annotated checklist of the rotifers (Phylum Rotifera), with notes on nomenclature, taxonomy and distribution. *Zootaxa* 1564: 1-104.
- Sfakianakis, D.G., Koumoundouros, G., Divanach, P. & Kentouri, P. 2004. Osteological development of the vertebral column and of the fins in *Pagellus erythrinus* (L. 1758). Temperature effect on the developmental plasticity and morpho-anatomical abnormalities. *Aquaculture* 232: 407-424.
- Shan, X., Xiao, Z., Huang, W. & Dou, S. 2008. Effects of photoperiod on growth, mortality and digestive enzymes in miiuy croaker larvae and juveniles. *Aquaculture* 281: 70-76.

- Shansudin, L., Yusof, M., Azis, A. & Shukri, Y. 1997. The potential of certain indigenous copepod species as live food for commercial fish larval rearing. *Aquaculture* 151: 351-356.
- Sherwood, L., Klandorf, H. & Yancey, P.H. 2005. Endocrine systems. pp. 250-313. *In* Animal physiology: From genes to organisms. Brooks/Cole Cengage Learning.
- _____, Klandorf, H. & Yancey, P.H. 2013. Endocrine systems. pp. 268-334. *In* Animal physiology: From genes to organisms. 2nd ed. International editions. Brooks/Cole Cengage Learning.
- Shiao, J.C. & Hwang, P-P. 2006. Thyroid hormones are necessary for the metamorphosis of tarpon *Megalops cyprinoides* leptocephali. *J. Exp. Mar. Biol. Ecol.* 331: 121-132.
- Silbernagl, S. & Despopoulos, A. 2009. Hormones and reproduction. pp. 268-311. *In* Color atlas of physiology 6th ed. Thieme. Stuttgart.
- Silva-Briano, M., Adabache-Ortiz, A., Guerrero- Jiménez, G., Rico-Martínez, R. & Zavala-Padilla, G. 2015. Ultrastructural and morphological description of the three major groups of freshwater zooplankton (Rotifera, Cladocera, and Copepoda) from the State of Aguascalientes, Mexico. *In* Maaz (Ed) The transmission electron microscope - theory and applications. DOI: 10.5772/60659. www.intechopen.com. Diakses 04-10-2015.
- Silva, F.C.P., Nicoli, J.R., Zambonino-Infante, J.L., Le Gall, M-M., Kaushik, S. & Gatesoupe, F-J. 2010. Influence of partial substitution of dietary fish meal on the activity of digestive enzymes in the intestinal brush border membrane of gilthead sea bream, *Sparus aurata* and goldfish, *Carassius auratus*. *Aquaculture* 306: 233-237.
- Simbolon, D., Sondita, M.F.A. & Amiruddin. 2010. Komposisi isi saluran pencernaan ikan teri (*Stolephorus spp.*) di perairan Barru, Selat Makassar. *Ilmu Kelautan* 15(1): 7-16.
- Slamet, B. & Tridjoko. 1997. Pengamatan pemijahan alami, perkembangan embrio dan larva ikan kerapu batik, *Epinephelus microdon* dalam bak terkontrol. *J. Penelitian Perikanan Indonesia* 3(4): 40-50.
- Solbakken, J.S., Norberg, B., Watanabe, K. & Pittman, K. 1999. Thyroxine as a mediator of metamorphosis of Atlantic halibut *Hippoglossus hippoglossus*. *Environmtel biology of Fishes* 56: 53-65.
- _____, Berntessen, M.H.G., Norberg, B., Pittman, K. & Hamre, K. 2002. Different iodine and thyroid hormone levels between Atlantic halibut larvae fed wild zooplankton or *Artemia* from first exogenous feeding until post metamorphosis. *J. of Fish Biol.* 61(6): 1345-1362.
- Solomon, E.P., Berg, L.R. & Martin, D.W. 2011. Endocrine regulation. pp. 1052-1076. *In* Biology 9th ed. Brooks/Cole Cengage Learning. Canada.
- Sørensen, T.F., Drillet, G., Engell-Sørensen, K., Hansen, B.W. & RamLøv, H. 2007. Production and biochemical composition of eggs from neritic calanoid copepods reared in large outdoor tanks (Limfjord, Denmark). *Aquaculture* 263: 84-96.
- Srichanun, M., Tantikitti, C., Vatanakul, V. & Musikarune, P. 2012. Digestive enzyme activity during ontogenetic development and effect of live feed in

- green catfish larvae (*Mystus nemurus* Cuv. & Val.). *Songklanakarin J. Sci. Technol.* 34(3): 247-254.
- Srichanun, M., Tantikitti, C., Utarabhand, P. & Kortner, T.M. 2013. Gene expression and activity of digestive enzymes during the larval development of Asian seabass (*Lates calcarifer*). *Comp. Biochem. Physiol.* B 165: 1-9.
- Srivastava, A.S., Kurokawa, T. & Suzuki, T. 2002. mRNA expression of pancreatic enzyme precursors and estimation of protein digestibility in first feeding larvae of the Japanese flounder *Paralichthys olivaceus*. *Comp. Biochem. Physiol.* A 132: 629-635.
- Srivastava, A., Hamre, K., Stoss, J., Chakrabari, R. & Tonheim, S.K. 2006. Protein content and amino acid composition of the live feed rotifer (*Brachionus plicatilis*): With emphasis on the water soluble fraction. *Aquaculture* 254: 534-543.
- Srivastava, S., Hamre, K., Stoss, J. & Nordgreen, A. 2012. A study on enrichment of the rotifer *Brachionus* "Cayman" with iodine from different sources. *Aquaculture* 334-337: 82-88.
- Stelzer, C-P. 2005. Evolution of rotifer life histories. *Hydrobiologia* 546: 335-346.
- Stepien, W.P. Jr. 1976. Feeding of laboratory-reared of the sea bream *Archosargus rhomboidalis* (Sparidae). *Mar. Biol.* 38: 1-16.
- Støttrup, J.G., Richardson, K., Kirkegaard, E. & Pihl, N.J. 1986. The cultivation of *Acartia tonsa* Dana for use as a live food source for marine fish larvae. *Aquaculture* 52: 87-96.
- _____ & Norsker, N.H. 1997. Production and use of copepods in marine fish larviculture. *Aquaculture* 155: 231-247.
- _____ 2000. The elusive copepods: their production and suitability in marine aquaculture. *Aquaculture Research* 31: 703-711.
- Sugama, K., Tridjoko, Slamet B., Ismi, S., Setiadi, E. & Kawahara, S. 2001. Petunjuk teknis produksi benih ikan kerapu bebek *Cromileptes altivelis*. Balai Riset Budidaya Laut Gondol dan Japan International Cooperation Agency. 40 p.
- _____ & Priono, B. 2003. Pengembangan budidaya ikan kerapu di Indonesia. *Warta Penelitian Perikanan Indonesia edisi akuakultur* 9(3): 20-22.
- Sugiyono. 2006. Statistik untuk penelitian. CV Alfabeta. Bandung.
- Sulistiono, Maulani, F., Brodjo, M. & Simanjuntak, C.P.H. 2010. Studi tentang jenis pakan ikan kresek (*Thryssa mystax*) di perairan Ujung Pangkah Jawa Timur. *J. Ilmu Dasar* 11(2): 187-196.
- Sumiarsa, G.S., Susanto, B., Suastika, M. & Imanto, P.T. 2005. Pertumbuhan dan sintasan fase awal larva ikan kerapu macan *Epinephelus fuscoguttatus* dengan pakan alami naupli kopepoda Harpacticoid *Tisbe holothuriae* dan rotifer. pp. 7-11. *Dalam* Prosiding Konferensi Akuakultur Indonesia, Masyarakat Akuakultur Indonesia. Badan Penerbit Universitas Diponegoro. Semarang.

- Suwirya, K. 2005. Spawning and larval rearing of coral trout at Gondol. *SPC Live Reef Fish Information Bull.* 13:45.
- _____, R. Andamari, R. & Melianawati, R. 2005. Penyerapan energi endogen larva ikan kerapu sunu (*Plectropomus leopardus*) pada tahap awal. pp. 362-367. *Dalam* Subagja, J. *et al.* (Ed). Prosiding Seminar Nasional dan Kongres Biologi XIII. Yogyakarta.
- _____, Prijono, A., Hanafi, A., Andamari, R., Melianawati, R., Marzuqi, M., Sugama, K. & Giri, N.A. 2006. Pedoman teknis pembenihan ikan kerapu sunu (*Plectropomus leopardus*). Pusat Riset Perikanan Budidaya. 18 p.
- _____ & Andamari, R. 2008. Perkembangan embrio, lemak dan asam lemak pada larva kerapu sunu (*Plectropomus leopardus*) pada stadia awal. pp. 1-6. BI-06. *Dalam* Djumanto *et al.* (Ed). Prosiding Seminar Nasional Tahunan V Jilid 2 Hasil Penelitian Perikanan dan Kelautan, Universitas Gadjah Mada. Yogyakarta.
- Suzer, C., Aktülün, S., Çoban, D., Kamacı, H.O., Saka, S., Firat, K. & Albaz, A. 2007. Digestive enzyme activities in larvae of sharpsnout seabream (*Diplodus puntazzo*). *Comp. Biochem. Physiol. A* 148: 470-477.
- _____, Coban, D., Yildirim, S., Hekimoğlu, M., Kamacı, H.O., Firat, K. & Saka, S. 2014. Stage-specific ontogeny of digestive enzymes in the cultured common dentex (*Dentex dentex*) larvae. *Turk. J. Fish. Aquat. Sci.* 14: 759-768.
- Swainston, R. 2005. Coral trout. Fisheries of Queensland's East Coast. www.reef.crc.org.au. Diakses 19-06-2013.
- Tagawa, M. & Hirano, T. 1987. Presence of Thyroxine in eggs and changes in its content during early development of chum salmon, *Oncorhynchus keta*. *Gen. Comp. Endocrinol.* 68: 129-135.
- _____ & Hirano, T. 1990. Changes in tissue and blood concentrations of thyroid hormones in developing chum salmon. *Gen. Comp. Endocrinol.* 76: 437-443.
- Takahashi, T & Ohno, A. 1996. The temperature effect on the development of calanoid copepod, *Acartia tsuensis*, with some comments to morphogenesis. *Journal of Oceanography* 52: 125-137.
- Taillebois, L., Keith, P., Valade, P., Torres, P., Baloché, S., Dufour, S. & Rousseau, K. 2011. Involvement of thyroid hormones in the control of larval metamorphosis in *Sicyopterus lagocephalus* (Teleostei: Gobioidae) at the time of river recruitment. *Gen. Comp. Endocrinol.* 173: 281-288.
- Tamaru, C.S., Lee, C.S. & Ako, H. 1991. Improving the larval rearing of striped mullet (*Mugil cephalus*) by manipulating quantity and quality of the rotifer, *Brachionus plicatilis*. pp. 89-103. *In* Rotifers & Microalgae Culture Systems. Proceedings of a U.S.-Asia Workshop. Hawaii.
- Tanaka, M., Tanangonan, J.B., Tagawa, M., de Jesus, E.G., Nishida, H., Isaka, M., Kimura, R. & Hirano, T. 1995. Development of the pituitary, thyroid and interrenal glands and applications of endocrinology to the improved rearing of marine fish larvae. *Aquaculture* 135: 111-126.

- Tang, X., Liu, X., Zhang, Y., Zhou, P. & Lin, H. 2008. Molecular cloning, tissue distribution and expression profiles of thyroid hormone receptors during embryogenesis in orange-spotted grouper (*Epinephelus coioides*). *Gen. Comp. Endocrinol.* 159: 117-124.
- Tatjana-Mihaela. 2010. Hyperthyroidism and hypothyroidism, most successful is natural cure. <http://tatjana-mihaela.hubpages.com>. Diakses 26-07-2013.
- Tengjaroenkul, B., Smith, B.J., Caceci, T. & Smith, S.A. 2000. Distribution of intestinal enzyme activities along the intestinal tract of cultured Nile tilapia, *Oreochromis niloticus* L. *Aquaculture* 182: 317-327.
- Teruya, K., Hamasaki, K. & Takeuchi, H. 2003. Relationship between mouth size of hatchery-reared juveniles of coral trout, *Plectropomus leopardus* and maximum body size of damselfish, *Chromis viridis* as those prey. *Suisanzoshoku* 51(1): 35-40.
- Thompson, A.B. & Harrop, R.T. 1991. Feeding dynamics of fish larvae on copepods in the western Irish Sea, with particular reference to cod *Gadus morhua*. *Mar. Ecol. Prog. Ser.* 68: 213-223.
- Thongprajukaew, K., Kovitvadhi, U., Kovitvadhi, S., Somsueb, P. & Rungruangsak-Torrissen, K. 2011. Effects of different modified diets on growth, digestive enzyme activities and muscle compositions in juvenile Siamese fighting fish (*Betta splendens* Regan, 1910). *Aquaculture* 322-323: 1-9.
- Tillner, R., Rønnestad, I., Dhert, P. & Ueberschär, B. 2014. The regulatory loop between gut cholecystokinin and tryptic enzyme activity in sea bass (*Dicentrarchus labrax*) larvae is influenced by different feeding regimes and trigger substances. *Aquaculture* 420-421: 139-146.
- Toledo, J.D., Golez, M.S., Doi, M. & Ohno, A. 1999. Use of copepod nauplii during early feeding stage of grouper *Epinephelus coioides*. *Fish. Sci.* 65(3): 390-397.
- Torrissen, K.R. & Shearer, K.D. 1992. Protein digestion, growth and food conversion in Atlantic salmon and Arctic charr with different trypsin-like isozyme patterns. *J. Fish Biol.* 42: 409-415.
- Tridjoko, Slamet, B., Makatutu, D. & Sugama, K. 1996. Pengamatan pemijahan dan perkembangan telur ikan kerapu bebek *Cromileptes altivelis* pada bak secara terkontrol. *J. Penelitian Perikanan Indonesia* 2(2): 55-62.
- _____, Slamet, B., Aslianti, T., Wardoyo, Ismi, S., Hutapea, J.H., Setiawati, K.M., Rusdi, I., Makatutu, D., Prijono, A., Setiadharna, T., Hirokazu, M. & Shigeru, K. 1999. Research and development: The seed production technique of humpback grouper, *Cromileptes altivelis*. JICA and Gondol research station for coastal fisheries. 55 p.
- Trijuno, D.D., Yoseda, K., Hirokawa, J., Tagawa, M. & Tanaka, M. 2002. Effects of thyroxine and thiourea on the metamorphosis of coral trout grouper *Plectropomus leopardus*. *Fish. Sci.* 68: 282-289.
- Trujillo-Ortiz, A. 1986. Life cycle of the marine calanoid copepod *Acartia californensis* Trinast reared under laboratory conditions. *CalCOFI XXVII*: 188-204.

- Tsunogai, S. & Henmi, T. 1971. Iodine in the surface water of the sea. *J. Oceanog. Soc. Japan* 27(2): 67-72.
- Turner, C.D. & Baganara, J.T. 1971. The thyroid gland. pp. 182-234. *In* General endocrinology 3rd ed. Toppan Company.
- Turner, J.T. 2004. The importance of small planktonic copepods and their roles in pelagic marine food webs. *Zoological studies* 43(2): 255-266.
- Twelves, E.L., Everson, I. & Leith, I. 1975. Thyroid structure and function in two Antarctic fishes. *Br. Antarct. Surv. Bull.* 40: 7-14.
- Ueberschar, B. 1995. Measurement of proteolytic enzyme activity: significance aspects of fish development. pp. 233-239. *In* Walter, B.T. & H.J. Fyhn. Physiological and biochemical aspect of fish development.
- Uscanga-Martínez, A., Perales-García, N., Álvarez-González, C.A., Moyano, F.J., Tovar-Ramírez, D., Gisbert, G.E., Márquez-Couturier, G., Contreras-Sánchez, W.M., Arias-Rodríguez, L. & Indy, J.R. 2011. Changes in digestive enzyme activity during initial ontogeny of bay snook *Petenia splendida*. *Fish Physiol. Biochem.* 37: 667-680.
- Van der Meeren, T., Olsen, R.E., Hamre, K. & Fyhn, H.J. 2008. Biochemical composition of copepods for evaluation of feed quality in production of juvenile marine fish. *Aquaculture* 274: 375-397.
- Vengadeshperumal, N., Damotharan, P., Rajkumar, M., Perumal, P., Vijayalakshmi, S. & Balasubramanian, T. 2010. Laboratory culture and biochemical characterization of the calanoid copepod, *Acartia southwelli* Sewell, 1914 and *Acartia centrura* Giesbrecht, 1889. *Advances in Biol. Res.* 4(2): 97-107.
- Vu, M.T.T., Jepsen, P.M. & Hansen, B.W. 2014. A comprehensive and precise quantification of the calanoid copepod *Acartia tonsa* (Dana) for intensive live feed cultures using an automated ZooImage system. *Aquaculture* 422-423: 225-231.
- Wærvågen, S.B., Rukke, N.A. & Hessen, D.O. 2002. Calcium content of crustacean zooplankton and its potential role in species distribution. *Freshwater Biol.* 47(10): 1866-1878.
- Walford, J. & Lam, T.J. 1993. Development of digestive tract and proteolytic enzyme activity in seabass (*Lates calcarifer*) larvae and juveniles. *Aquaculture* 109: 187-205.
- Wallace, R.A. 1991. Enzymes. pp. 65-68. *In* Biology, the world of life. 6th ed. Harper Collins Publishers.
- _____, Sanders, G.P. & Ferl, R.J. 1996. Hormonal control. pp. 765-787. *In* Biology, The science of life. 4th ed. HarperCollins College Publisher.
- Walpita, C.N., der Geyten, S.V., Rurangwa, E. & Darras, V.M. 2007. The effect of 3,5,30-triiodothyronine supplementation on zebrafish (*Danio rerio*) embryonic development and expression of iodothyronine deiodinases and thyroid hormone receptors. *Gen. Comp. Endocrinol.* 152: 206-214.
- Walter, T.C. & Boxshall, G. 2015. World of copepods database. <http://www.marinespecies.org/copepoda>. Diakses 22-11-2015.

- Wang, C., Xie, S., Zhu, X., Lei, W., Yang, Y. & Liu, J. 2006. Effects of age and dietary protein level on digestive enzyme activity and gene expression of *Pelteobagrus fulvidraco* larvae. *Aquaculture* 254: 554-562.
- Watanabe, T. 2007. Importance of docosaheptaenoic acid in marine larval fish. *J. of the World Aquaculture Society* 24(2): 152-161.
- Wei, L., Xiu-Mei, Z. & Li-Bo, W. 2010. Digestive enzyme and alkaline phosphatase activities during the early stages of *Silurus soldatovi* development. *Zoological Research* 31(6): 627-632.
- Weichert, C.K. 1965. Endocrine system. In *Anatomy of the chordates* 3th ed. McGraw-Hill book company. 701 pp.
- Weltzien, F.A., Planas, M., Cunha, I., Evjen, M.S. & Fhyn, H.J. 1999. Free amino acid and protein contents of start-feeding larvae of turbot (*Scophthalmus maximus*) at three temperatures. *Mar. Biol.* 133: 327-336.
- Wen, C.K.C., Pratchett, M.S., Almany, G.R., & Jones, G.P. 2013. Role of prey availability in microhabitat preferences of juvenile coral trout (*Plectropomus: Serranidae*). *J. Exp. Mar. Biol. Ecol.* 443: 39-45.
- Wendl, T., Lun, K., Mione, M., Favor, J., Brand, M., Wilson, S.W. & Rohr, K.B. 2002. Pax2.1 is required for the development of thyroid follicles in zebrafish. *Development* 129: 3751-3760.
- Wexler, J. B., Margulies, D. & Scholey, V.P. 2011. Temperature and dissolved oxygen requirements for survival of yellowfin tuna, *Thunnus albacares*, larvae. *J. Exp. Mar. Biol. Ecol.* 404: 63-72.
- William, A.J., Currey, L.M., Begg, G.A., Murchie, C.D. & Ballagh, A.C. 2008. Population biology of coral trout species in eastern Torres Strait: Implications for fishery management. *Continental Shelf Research* 28: 2129-2142.
- Wilson, C.M. & McNabb, F.M.A. 1997. Maternal thyroid hormones in Japanese Quail eggs and their influence on embryonic development. *Gen. Comp. Endocrinol.* 107: 153-165.
- Witt, E.M., Laidley, C.W., Liu, K.K.M., Hirano, T. & Grau, E.G. 2009. Correlation between environmental iodide concentrations and larval growth, survival, and whole body concentrations of thyroid hormones and cortisol in Pacific threadfin (*Polydactylus sexfilis*). *Aquaculture* 289: 357-364.
- Yamano, K., Tagawa, M., de Jesus, E.G., Hirano, T., Miwa, S. & Inui, Y. 1991. Changes in whole body concentrations of thyroid hormones and cortisol in metamorphosing conger eel. *J. Comp. Physiol. B* 161: 371-375.
- _____. 2005. The role of thyroid hormone in fish development with reference to aquaculture. *JARQ* 39 (3): 161-168.
- _____, Nomura, K. & Tanaka, H. 2007. Development of thyroid gland and changes in thyroid hormone levels in Leptocephali of Japanese Eel (*Anguilla japonica*). *Aquaculture* 270: 499-504.
- Yoseda, K., Asami, K., Fukumoto, M., Takaira, S., Kurokawa, Y. & Kawai, S. 2003a. Effects of two types of rotifer on first-feeding success and early survival in coral trout *Plectropomus leopardus* larvae. *Suisanzoshoku* 51(1): 101-108.

- _____, Dan, S., Fuji, A., Kurokawa, Y. & Kawai, S. 2003b. Effects of different photoperiods on first-feeding success, early survival and digestive enzyme activities in coral trout *Plectropomus leopardus* larvae. *Suisanzoshoku* 51(2): 179-188.
- _____, Teruya, K., Yamamoto, K. & Asami, K. 2006. Effects of different temperature and delayed initial feeding on larval feeding, early survival, and the growth of coral trout grouper, *Plectropomus leopardus* larvae. *Aquaculture Science* 54(1): 43-50.
- _____, Yamamoto, K., Asami, K., Chimura, M., & Hashimoto, K. 2008. Influence of light intensity on feeding, growth, and early survival of leopard coral grouper (*Plectropomus leopardus*) larvae under mass-scale rearing conditions. *Aquaculture* 279: 55-62.
- Zhu, Z.Y. & Yue, G.H. 2008. The complete mitochondrial genome of red grouper *Plectropomus leopardus* and its applications in identification of grouper species. *Aquaculture* 276: 44-49.
- Zhou, Q., Zhou, J., Chi, S., Yung, Q. & Liu, C. 2007. Effect of dietary lipid level on growth performance, feed utilization and digestive enzyme of juvenile ivory shell, *Babylonia areolate*. *Aquaculture* 272: 535-540.
- Zorica, B., Sinovčić, G. & Keč, V.Č. 2010. Preliminary data on the study of otolith morphology of five pelagic fish species from the Adriatic Sea (Croatia). *Acta Adriat* 51(1): 89-96.